

What is claimed is:

1. A braking system for a vehicle having at least one wheel comprising:
  - 5 at least one battery capable of receiving and supplying power;
  - a battery switch;
  - a plurality of eddy current devices that provide a retarding torque to the wheel of the vehicle when energized;
  - a throttle position sensor for sensing a throttle position of the vehicle;
  - a brake pedal;
- 10 a brake pedal sensor coupled to the brake pedal for generating a brake pedal position signal;
- a wheel speed sensor for determining the speed of the wheel and generating a wheel speed sensor signal;
- 15 a generator for supplying power to the eddy current devices and the battery for charging when the brake pedal sensor senses that the vehicle operator has placed the brake pedal in a predetermined brake pedal position, the throttle position is less than a predetermined throttle position, and the wheel speed is greater than a predetermined wheel speed threshold; and
- 20 a controller having memory storage capability, the controller for storing, a predetermined throttle position threshold, a predetermined brake pedal position, and a predetermined wheel speed threshold in memory and receiving inputs from the brake pedal sensor, the wheel speed sensor, a power module and the generator, and the controller for generating signals for the battery switch.

  

- 25 2. A braking system according to claim 1, wherein the eddy current devices are electromagnetic retarders.
- 30 3. A braking system according to claim 1, wherein the plurality of eddy current devices equals 4.
4. A braking system according to claim 1, wherein the generator has an operating voltage of about 42 volts.

5. A braking system according to claim 1, wherein the battery has a nominal voltage of 36 volts.

5           6. A braking system according to claim 1, wherein the predetermined brake pedal position of the brake pedal is a depressed position.

10          7. A braking system control method for a vehicle having a generator, a battery, a  
brake pedal sensor, at least one wheel, and a wheel speed sensor, the method comprising the  
steps of:

detecting a braking demand based on an input from the brake pedal sensor;  
comparing the braking demand to a predetermined brake demand threshold;  
decoupling the battery from the generator when the braking demand is greater than  
the predetermined brake demand threshold;

15          detecting a wheel speed based on an input from the wheel speed sensor;  
comparing the wheel speed to a predetermined wheel speed threshold when the  
braking demand is less than the predetermined brake demand threshold;

comparing the generator voltage to the battery voltage when the wheel speed is  
greater than the predetermined wheel speed threshold; and

20          coupling the generator to the battery when the generator voltage is greater than the  
battery voltage thereby charging the battery.

8. A braking system control method for a vehicle having a generator, a battery, a  
brake pedal, and at least one wheel, a wheel speed sensor, the method comprising the steps of:

25          detecting a throttle position based on inputs from a throttle position sensor;  
comparing the throttle position to a predetermined throttle position threshold;  
decoupling the battery from the generator when the throttle position is less than  
the predetermined throttle position threshold;

30          detecting a braking demand based on inputs from the brake pedal sensor;  
comparing the braking demand to a predetermined brake demand threshold when  
the throttle position is greater than the predetermined throttle position threshold;

decoupling the battery from the generator when the braking demand is greater than the predetermined brake demand threshold;

detecting a wheel speed based on inputs from the wheel speed sensor;

comparing the wheel speed to a predetermined wheel speed threshold when the

5 braking demand is less than the predetermined brake demand threshold;

comparing the generator voltage to the battery voltage when the wheel speed is greater than the predetermined wheel speed threshold; and

coupling the generator to the battery if the generator voltage is greater than the battery voltage to thereby charge the battery.

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9. A braking system control method according to claim 8, wherein the predetermined throttle position ranges from 5 to 10 degrees from a non-depressed position.

10. A braking system control method for a vehicle having a generator, a battery, a  
15 brake pedal capable of generating a brake pedal position signal and at least one wheel, the method comprising the steps of:

determining a throttle position based on inputs from a throttle position sensor;

comparing the throttle position to a predetermined throttle position threshold;

generating a first command signal for a battery switch to decouple the battery from  
20 the generator thereby preventing charging of the battery when the throttle position is greater than the predetermined throttle position threshold;

comparing the brake pedal position signal based on the position of a brake pedal to a predetermined brake pedal position when the throttle position is less than the predetermined throttle position threshold;

25 generating the first command signal for the battery switch to decouple the battery from the generator when the brake pedal position signal is greater than the predetermined brake pedal position and the throttle position is less than the predetermined throttle position threshold;

comparing a wheel speed sensor signal based on the wheel speed to a  
30 predetermined wheel speed threshold when the brake pedal position signal is less than the predetermined brake pedal threshold and the throttle position is less than the predetermined throttle position threshold;

generating the first command signal to for the battery switch to decouple the battery from the generator when the wheel speed is less than the predetermined wheel speed threshold, the brake pedal position signal is less than the predetermined brake pedal position, and throttle position is less than the predetermined throttle position threshold; and

5 generating a second command signal to electrically couple the battery to the generator thereby enabling the generator to charge the battery when the wheel speed is greater than the predetermined wheel speed threshold, the throttle position is less than the predetermined throttle position threshold, and the brake pedal position signal is less than the predetermined brake pedal position.

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11. A braking system control method according to claim 10, wherein the predetermined throttle position ranges from 5 to 10 degrees from a non-depressed position.

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12. A braking system control method according to claim 10, wherein the predetermined brake pedal position is a depressed position.

13. A braking system control method according to claim 10, wherein the predetermined wheel speed threshold is at least 50 revolutions per minute.

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